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Real-time correlations in non-Abelian gauge theory via complex Langevin

Real-time correlations of realistic field theories are necessary for direct computations of spectral functions and transport coefficients. Using the complex Langevin method, we discuss our recent progress in computing unequal-time correlation functions in 3+1-dimensional non-Abelian lattice gauge theory from first principles. Obtaining results on a maximal time extent over temperature $t_{\max} = 3.5/T$, we directly extract the statistical and spectral functions separately and show the emergence of the KMS relation together with other properties of the studied thermal plasma. This demonstrates the potential applicability of the complex Langevin method to direct computations of excitation spectra and viscosities and represents a viable approach to real-time field theories.

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